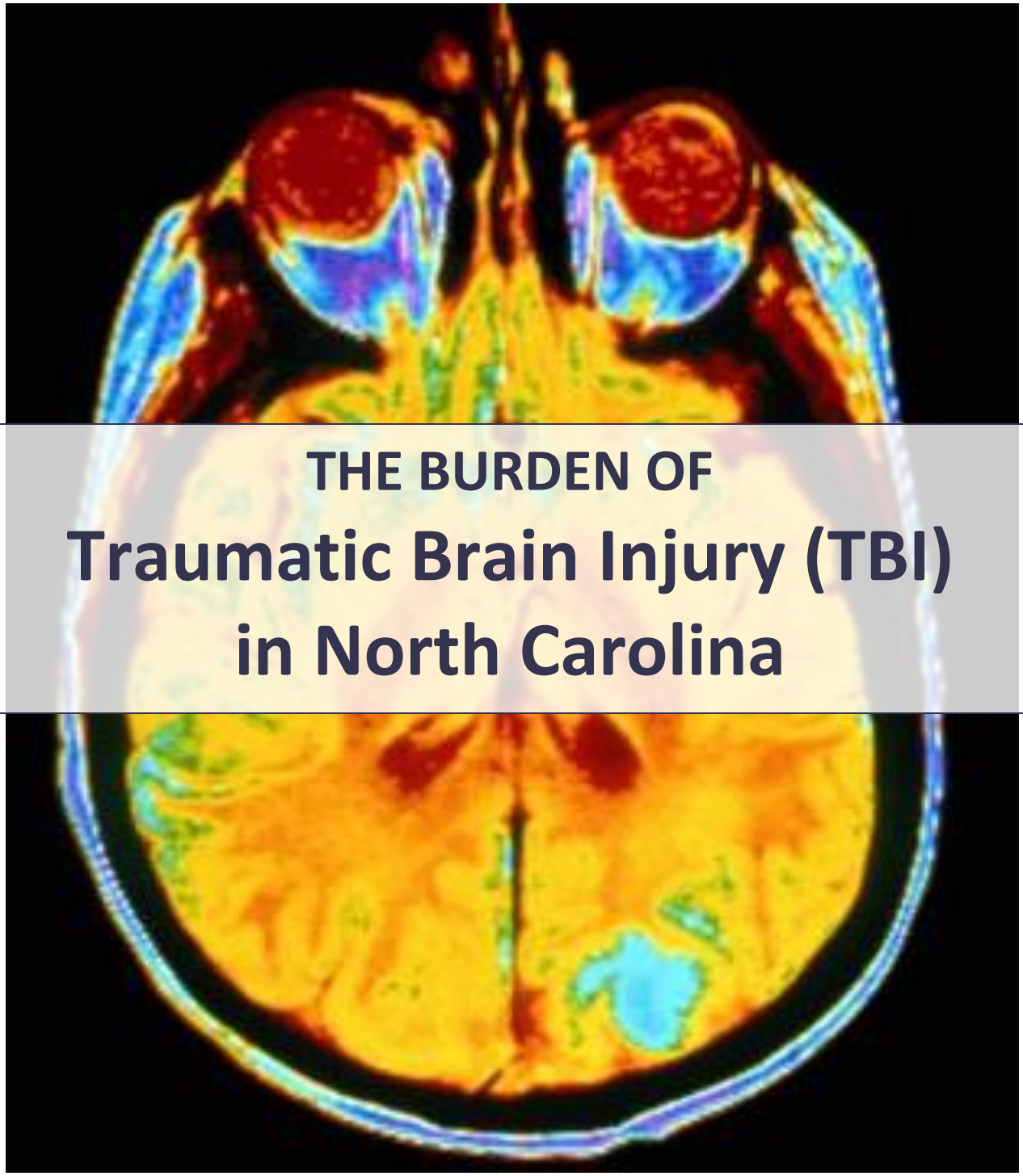

THE BURDEN OF
Traumatic Brain Injury (TBI) in North Carolina

nc department of health and human services

North Carolina Injury & Violence PREVENTION Branch

NCPH North Carolina Public Health

THE BURDEN OF Traumatic Brain Injury in North Carolina

March 2014

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Department of Health and Human Services
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Acknowledgements:

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Highlights:

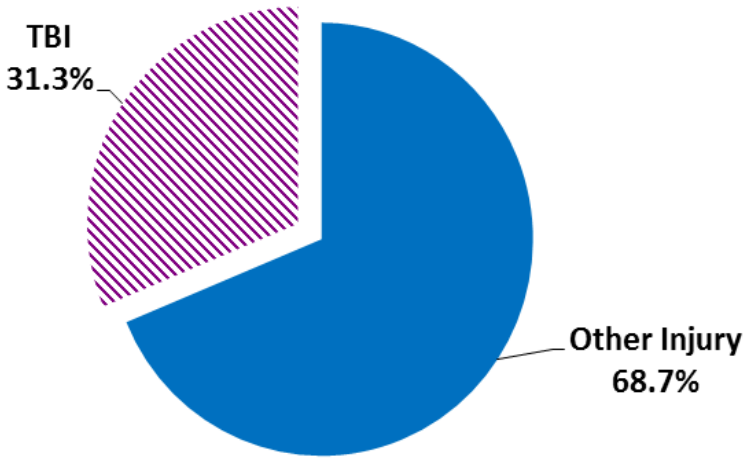
- **In 2012, 1,872 North Carolina residents died after sustaining a traumatic brain injury (TBI).**
- **TBIs accounted for 31.3 percent of all injury deaths in 2012.**
- **In 2012, the rate of TBI deaths was 19.2 per 100,000 North Carolina residents.**
- **Males were two and a half times as likely to die from TBIs as females.**
- **In 2012, the rate of death due to TBIs increased with increasing age. In 2012, individuals age 85 and older had the highest mortality rates for all age groups.**
- **The three most common causes of TBI deaths were firearms, motor vehicle-traffic (MVT) crashes, and falls.**
- **In 2012, the rates of hospitalizations (75.3 per 100,000) and ED visits (761.2 per 100,000) due to TBI were much higher than the rate of TBI deaths.**

Overview and Trends of Traumatic Brain Injuries (TBI) in North Carolina:

Injury and violence are the third leading cause of death in North Carolina following only heart disease and cancer[1]. In 2012 alone, injury was cited as the primary cause of death in 5,989 fatalities[2].

One of the more common forms of injury in North Carolina is traumatic brain injury (TBI). Although TBI is not a manner or specific cause of injury, its frequency and potential for both disability and death warrant attention. In 2012, 1,872 deaths were due to TBI. TBIs accounted for more than 30 percent of all injury deaths (Figure 1).

Figure 1: Percent of Injury Deaths due to Traumatic Brain Injuries (TBI): North Carolina Residents, 2012

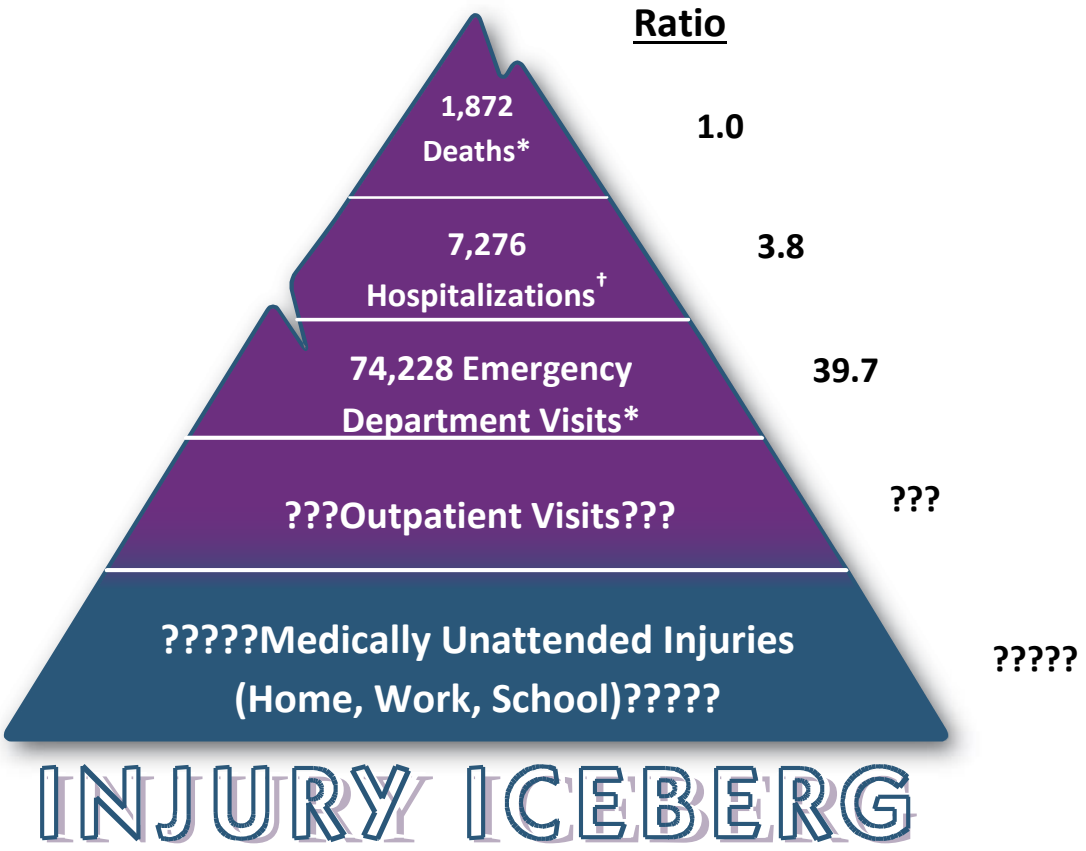


Data: N.C. State Center for Health Statistics, 2012
Analysis: Injury Epidemiology and Surveillance Unit

TBIs occur when acute trauma damages the brain and may lead to a closed or penetrating head injury[3]. The Centers for Disease Control and Prevention (CDC) refer to TBI as the "silent epidemic" because many of the signs, symptoms, and sequelae of TBI, such as memory loss, are not readily recognizable. TBIs vary in severity from mild injuries that require minimal medical attention to severe injuries that may cause death or life-long disability. In the United States, approximately 52,000 people die, 275,000 people are hospitalized, and 1.3 million people visit an emergency department (ED) due to a TBI each year[4]. These numbers do not reflect the untold thousands who visit a primary care physician or seek no medical attention in the event of a TBI. Of the many who survive their injuries, about 80,000 will suffer some form of disability[3].

The Injury Iceberg illustrates the overall burden that TBI has on the population of North Carolina. Deaths account for only the "tip" of the iceberg in regards to TBI injuries. For each death, there are approximately 4 hospitalizations and 40 ED visits[5,6,7]. Surveillance data are not available for outpatient clinics or for TBIs that are not medically attended; however, these numbers are likely to be far higher than the number of ED visits (Figure 2).

Figure 2: The Injury Iceberg—TBI Injuries: North Carolina Residents, 2011 and 2012



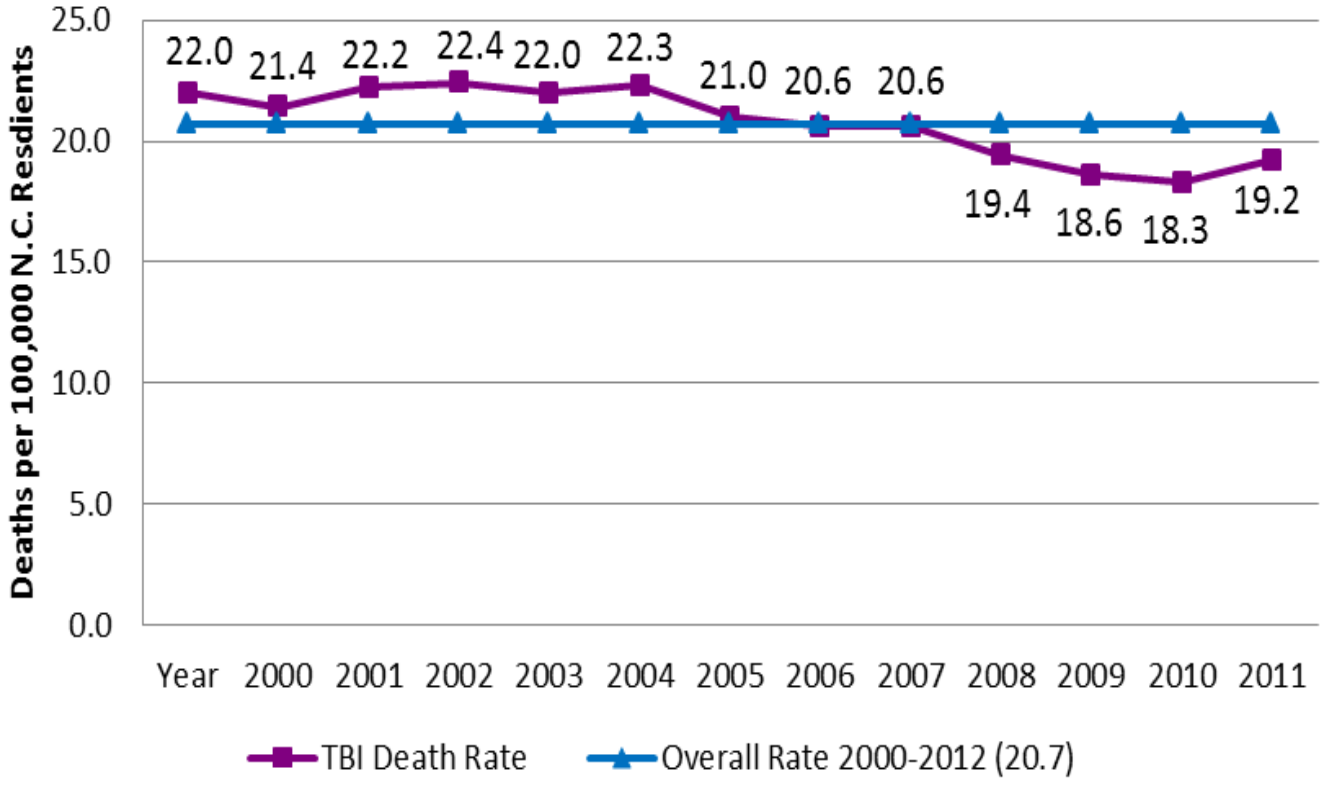
*2012 data
†2011 data

Data: N.C. State Center for Health Statistics, 2011, 2012; NC DETECT, 2011
Analysis: Injury Epidemiology and Surveillance Unit

The rate of death from TBIs remained relatively stable from 2000 to 2007 and decreased slightly from 2008 to 2012. The overall rate of death from TBI between 2000 and 2012 was 20.7 per 100,000 residents (95% CI 20.4-21.0; see Notes pg. 23). In 2012, the rate of TBI death was 19.2, slightly less than the overall rate observed between 2000 and 2012 for North Carolina residents (Figure 3).

Although national TBI data are not available for 2012, the national death rate for the most recent year available (2006) was 17.9, a decrease from the 2005 national death rate of 18.2.[8] Nationally, TBI deaths and hospitalizations appear to have declined during the past few decades, although this trend is not uniform for all causes of TBI[9,10].

Figure 3: Rates of TBI Deaths: North Carolina Residents, 2000-2012



Data: N.C. StateCenter for Health Statistics, 2012
Analysis: Injury Epidemiology and Surveillance Unit

Demographics of TBI Deaths:

In 2012, 1,872 North Carolina residents died after sustaining a TBI. Table 1 provides demographic characteristics of these deaths. In North Carolina, certain populations were at a greater risk of suffering a fatal TBI in 2012:

- Men were considerably more likely to die from a TBI then women. More than two-thirds of all TBI deaths occurred in the males (71%). The rate of deaths from TBI in men was 28.0 (95% CI 26.5-29.5) while the rate in women was 10.8 (95% CI 9.9-11.7).
- Hispanics (9.8, 95% CI 7.7-11.9) had a lower rate of TBI death than non-Hispanics (20.1, 95% CI 19.2-21.0).
- Whites had the highest rate of death due to TBI of all racial groups. Whites had a rate of 21.3 (95% CI 20.2-20.2) followed by American Indians with a rate of 20.5 (95% CI 13.5-27.5).
- Adults age 85 and older had the highest rate of death due to TBI of all age groups (130.1, 95% CI 112.4-147.8). Adults in this age group had a rate that was 2.3 times higher than the age group with next highest rate (adults ages 75 to 84; 57.4, 95% CI 50.0-64.8) and 42 times higher than children ages 10 to 14 (3.1, 95% CI 1.7-4.5).

Definitions:

The CDC defines a TBI as a "blow or jolt to the head or a penetrating head injury that disrupts the function of the brain[11]."

- **Severity of TBIs may range from mild to severe.**
- **One measure of TBI severity is the Glasgow Coma Scale (GCS). The GCS is based on best eye, verbal, and motor response[12].**
- **In general, most individuals who suffer a mild TBI recover quickly and fully, although repeated mild TBIs can result in neurological and cognitive deficits. A concussion is a common type of mild TBI that may or may not result in loss of consciousness[11].**
- **Adult populations, particularly the elderly, may have slower and less complete recovery after a mild TBI than younger individuals[13].**
- **Moderate TBIs are associated with temporary loss of consciousness. An individual with a moderate TBI will suffer more serious symptoms than a mild TBI, such as persistent headaches, repeated vomiting or nausea, seizures, memory loss, and confusion[3].**
- **Sufferers of severe TBIs demonstrate a complex combination of short- or long-term physical, cognitive, and behavioral challenges including issues with attention and memory, impaired coordination, hearing and vision loss, depression, anxiety, and aggression. Severe TBIs may result in a coma and carry a substantial risk for long-term disability or death[11].**

All TBI deaths and injuries are classified using the World Health Organization's International Classification of Disease codes ICD-10 (deaths) and ICD-9-CM (nonfatal injuries). Supplemental information is provided in the Notes (page 23) and Glossary sections (page 24).

Table 1: Sex, Race, Hispanic-Ethnicity, and Age of TBI Deaths: North Carolina Residents, 2012

		Number	Percent	Rate†	95% Confidence Interval	
					Lower	Upper
Sex						
	Male	1,330	71.0%	28.0	26.5	29.5
	Female	542	29.0%	10.8	9.9	11.7
Hispanic Ethnicity						
	Hispanic	83	4.4%	9.8	7.7	11.9
	Non-Hispanic	1,789	95.6%	20.1	19.2	21.0
Race						
	Asian	12	0.3%	4.5	1.9	7.1
	American Indian	33	1.8%	20.5	13.5	27.5
	Black	307	16.4%	13.8	12.3	15.3
	Other	4	0.2%	*	*	*
	White	1,516	80.9%	21.3	20.2	22.4
Age Group¥						
	0-4	35	0.2%	5.6	3.7	7.5
	5-9	14	0.7%	2.2	1.1	3.3
	10-14	20	1.1%	3.1	1.7	4.5
	15-19	83	4.4%	12.8	10.1	15.5
	20-24	156	8.3%	22.4	18.9	25.9
	25-34	232	12.4%	18.3	15.9	20.7
	35-44	193	10.3%	14.7	12.6	16.8
	45-54	292	15.6%	21.4	18.9	23.9
	55-64	223	11.9%	18.6	16.2	21.0
	65-74	182	9.7%	23.3	19.9	26.7
	75-84	233	12.4%	57.4	50.0	64.8
	85+	208	11.1%	130.1	112.4	147.8
Total		***1,872***	***100.0%***	***19.2***	***18.3***	***20.1***

*Rate is based on fewer than 10 deaths and is considered statistically unreliable.
†All rates are crude rates per 100,000 North Carolina residents.
¥Missing 1 of unknown age.

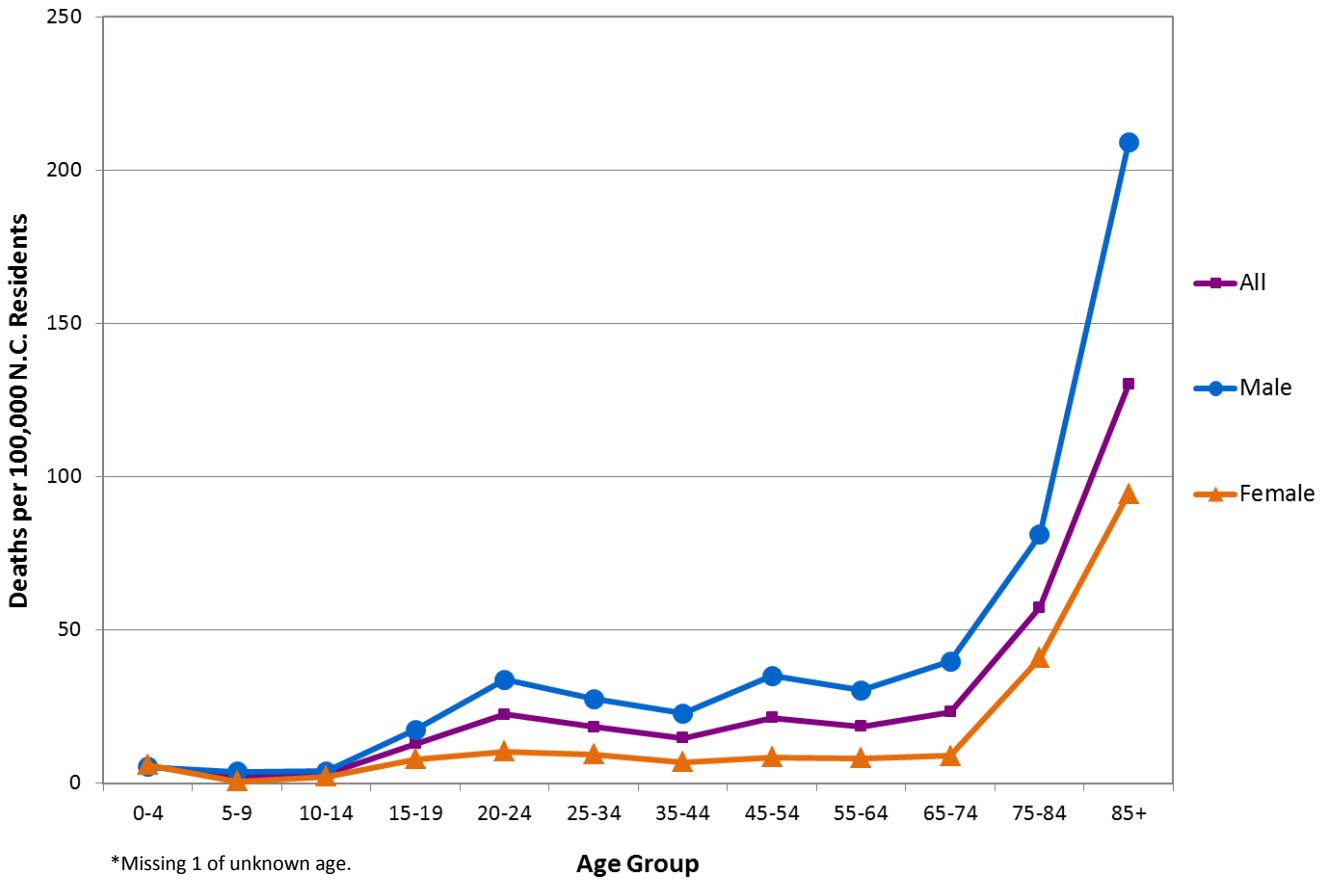
Data: N.C. State Center for Health Statistics, 2012
Analysis: Injury Epidemiology and Surveillance Unit

TBI rates differ considerably between different age groups and sexes. Figure 4 presents TBI deaths in North Carolina by age and sex for 2012:

- Males exhibited a small peak in deaths between the ages of 20 and 24 and a larger peak among those age 85 and older.
- The female population did not exhibit a large uptick in the rate of death from TBI until the age of 75, although this peak is less pronounced than the peak observed in older adult males.
- Males had a higher rate of deaths from TBI than females for all age groups.

These trends are not unique to North Carolina. Nationally, males have higher rates of death from TBIs in comparison to females for all age groups. Additionally, young adult males and the elderly of both sexes are at an increased risk of TBI fatality[4].

Figure 4: Rates of TBI Deaths by Sex and Age: North Carolina Residents, 2012



*Missing 1 of unknown age.

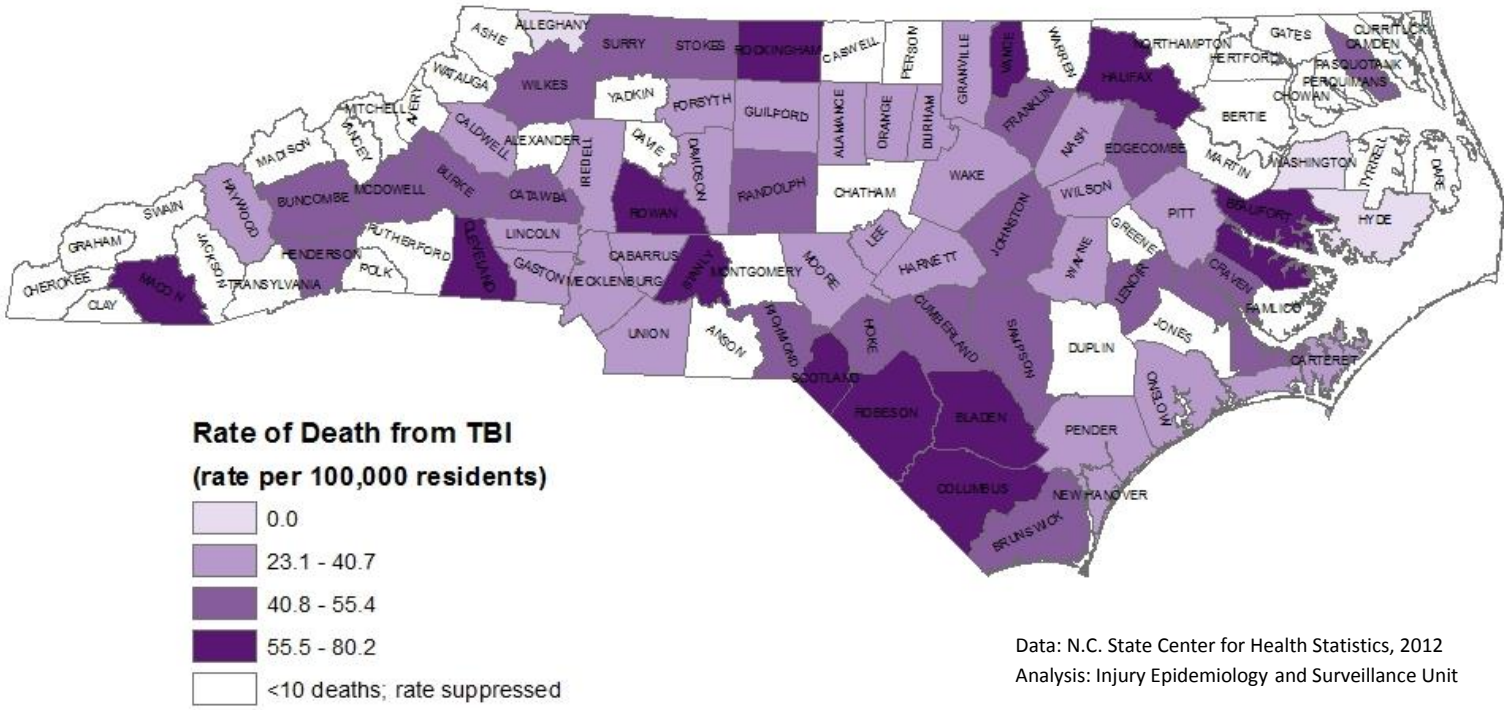
Data: N.C. State Center for Health Statistics, 2012
Analysis: Injury Epidemiology and Surveillance Unit

TBI Deaths by County for 2012:

The rates of fatal TBIs are not distributed equally across the state of North Carolina. Figure 5 presents the rates of TBI death by county for 2012. Counties with fewer than 10 deaths may have statistically unreliable rates, and rates for these counties have therefore been suppressed. Additionally, differences in rates between counties are due to an array of factors including population, infrastructure, and geographic differences.

- Of the counties with greater than 10 deaths, Bladen County had the highest rate of death from TBI (80.2, 95% CI 59.2-101.2). Robeson County (76.8, 95% CI 66.3-87.2) and Macon County (70.9, 95% CI 50.8-90.9) had the second and third highest deaths rates, respectively.
- Of the counties with greater than 10 deaths, Wake (23.1, 95% CI 20.9-25.3), Durham (25.0, 95% CI 20.9-29.2), and Mecklenburg Counties (25.8, 95% CI 23.5-28.1) had the lowest rates of death from TBI. Alleghany, Hyde, and Washington Counties had zero deaths from TBI in 2012.

Figure 5: Rate of TBI Death by County: North Carolina Residents, 2012



Data: N.C. State Center for Health Statistics, 2012
Analysis: Injury Epidemiology and Surveillance Unit

Demographics of TBI Hospitalizations and Emergency Department (ED) Visits:

For 2011, the median hospital bill for all hospital discharges due to TBI was about *$25,000* ($705-$1,920,168), and the total hospital charges for North Carolina were more than *$350 million*.

Deaths make up only a small portion of TBIs; nonfatal injuries are far more common. Hospital discharge records and data from emergency departments (EDs) provide additional insight into the extent of TBIs in North Carolina. Unfortunately, these data sources only provide a rough approximation of the full extent of nonfatal injuries in the state; injuries that are treated in outpatient clinics and in the home are not captured. Table 2 presents hospital discharge and ED data:

- North Carolina residents are almost four times more likely to be hospitalized and nearly 40 times more likely to visit the ED than to die from a TBI[2, 5, 6, 7].
- Although children ages zero to four do not constitute a large percentage of deaths or have a high death rate in comparison to other age groups, they have high rates of hospitalization (49.7 per 100,000) and even higher rates of ED visits (1,429.5 per 100,000).
- Adults older than 84 have the highest rates of TBI deaths, hospitalizations, and ED visits.

Table 2: Gender and Age of Deaths, Hospital Discharges, and Emergency Department (ED) Visits due to TBI: North Carolina Residents, 2011 and 2012

		Death[§]		Hospital Discharge[¥]		ED Visits[§]	
		Number	Rate[†]	Number	Rate[†]	Number	Rate[†]
Sex[£]							
	Male	1,330	28.0	4,321	91.9	38,498	810.0
	Female	542	10.8	2.955	59.7	35,714	714.4
Age Group[¤]							
	0-4	35	5.6	313	49.7	8,861	1,429.5
	5-9	14	2.2	115	18.1	4,641	722.5
	10-14	20	3.1	120	18.7	5,055	779.5
	15-19	83	12.8	400	61.2	6,950	1,068.6
	20-24	156	22.4	459	67.7	6,235	896.4
	25-34	232	18.3	634	50.2	8,283	654.2
	35-44	193	14.7	554	42.1	6,365	486.1
	45-54	292	21.4	799	58.3	6,470	474.9
	55-64	223	18.6	794	66.9	5,149	431.9
	65-74	182	23.3	890	122.5	4,869	627.4
	75-84	133	57.4	1,220	306.2	5,888	1,463.5
	85+	208	130.1	978	636.2	5,228	3,300.8
Total		***1,872***	***19.2***	***7,276***	***75.3***	***74,228***	***761.2***

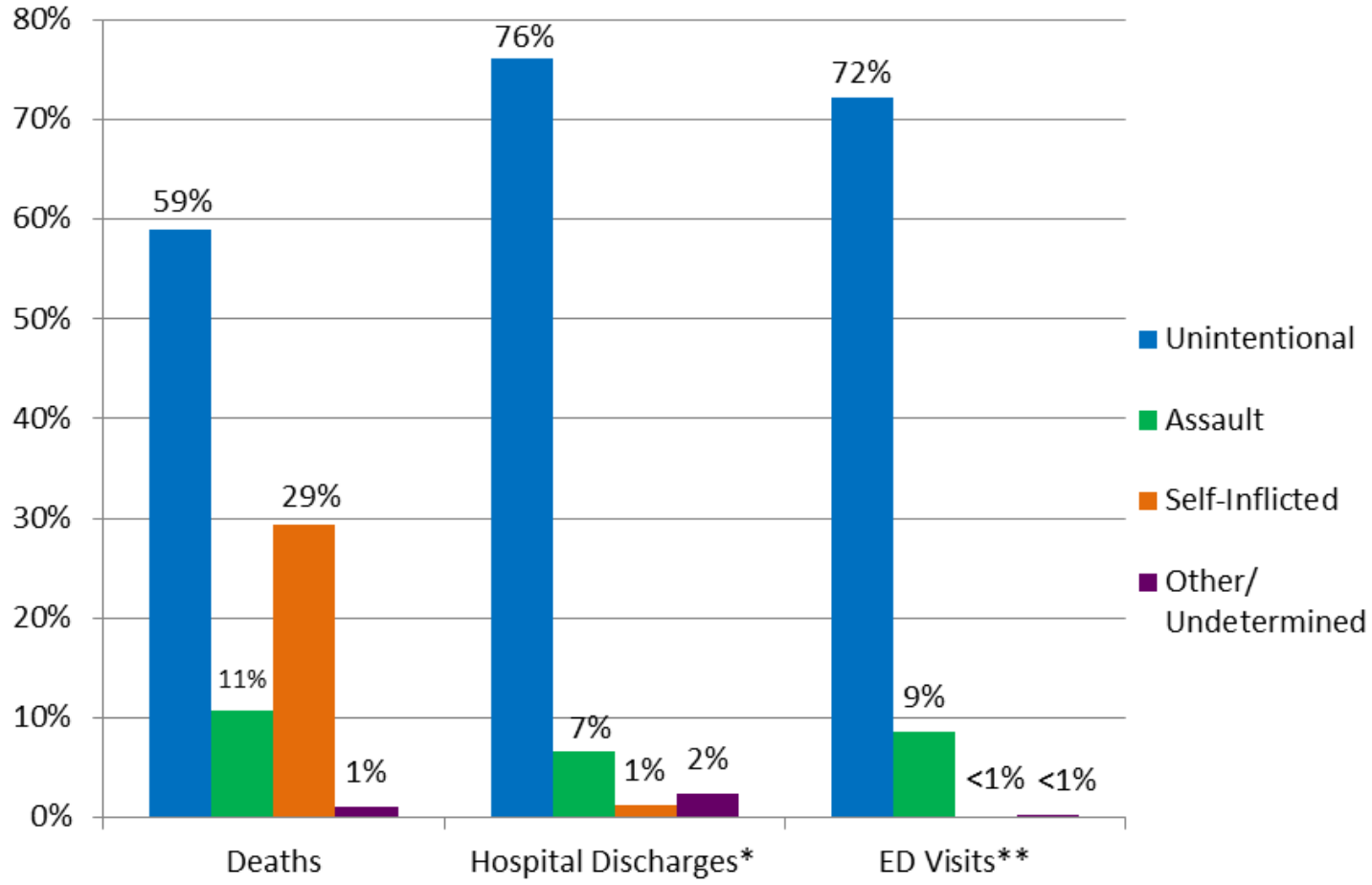
†All rates are crude rates per 100,000 North Carolina residents.
§Data are from 2012; ¥Data are from 2011
£ED: 15 missing sex ; ¤Deaths: 1 missing age; ED: 2 missing age.

Data: N.C. State Center for Health Statistics, 2011, 2012; NC DETECT, 2012
Analysis: Injury Epidemiology and Surveillance Unit

Intent of Injury:

TBI injuries can be either intentional, either self-inflicted (suicide) or assault (homicide), unintentional, or undetermined. As with most types of injury, unintentional injuries are the most common manner of TBI injury. Unintentional injuries accounted for 59 percent of deaths and 72 percent of ED visits in 2012 and 76 percent of hospitalizations in 2011. While only one percent of TBI hospitalizations and less than one percent of TBI ED visits were self-inflicted, a much higher percentage (29%) of TBI deaths were self-inflicted/suicide (Figure 6).

Figure 6: Intent of Injury of TBI Deaths[¥], Hospital Discharges[†], and ED Visits[¥]: North Carolina Residents, 2011 and 2012



[¥]Data are from 2012.
†Data are from 2011.
*Missing intent for 997 hospital discharges
**Missing intent for 14,002 ED visits

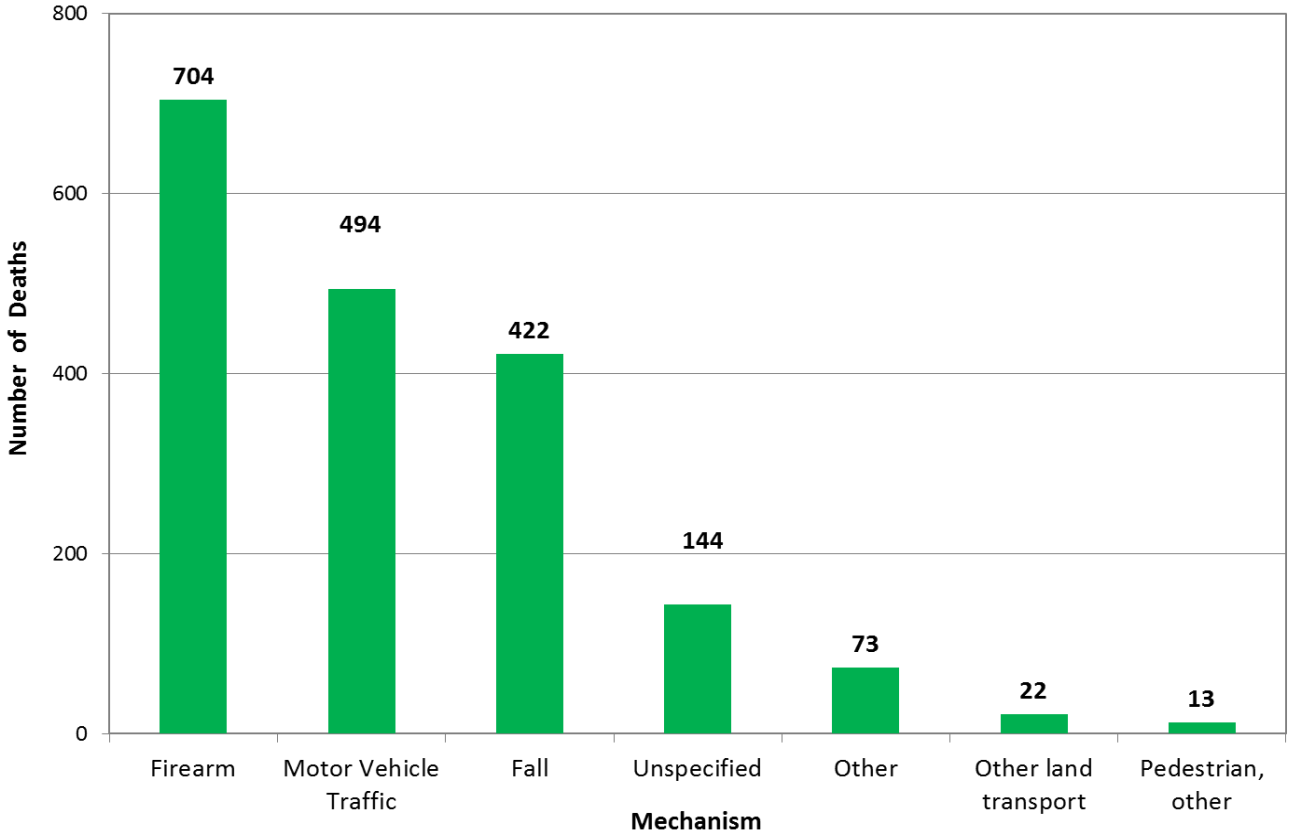
Data: N.C. State Center for Health Statistics, 2011, 2012; NC DETECT, 2012
Analysis: Injury Epidemiology and Surveillance Unit

Causes of TBI - Deaths:

TBIs may be due to any of a wide assortment of causes. Causes of death are classified using the International Classification of Disease, Version 10 (ICD-10) codes established by the CDC State Injury Indicators Report[8]. Figures 7 through 11 present leading mechanisms of TBI death in North Carolina in 2012. For additional information regarding these figures, including specific coding used to generate these figures, please see the Notes (page 23) and Glossary (page 24) sections.

- The leading mechanism of TBI deaths in North Carolina in 2012 was firearms with 704 deaths. Firearm-related TBI deaths accounted for more than 37 percent of all TBI deaths. Most of these deaths were either due to assault (homicide) or self-inflicted (suicide) injuries (Figure 7). Firearms are also the leading cause of TBI deaths nationally[14].
- Motor vehicle-traffic crashes (MVT) were the second leading cause of TBI death in North Carolina with 494 deaths (26.4%, Figure 7).
- The third leading mechanism of TBI deaths was falls with 422 deaths in 2012 (22.4%, Figure 7)

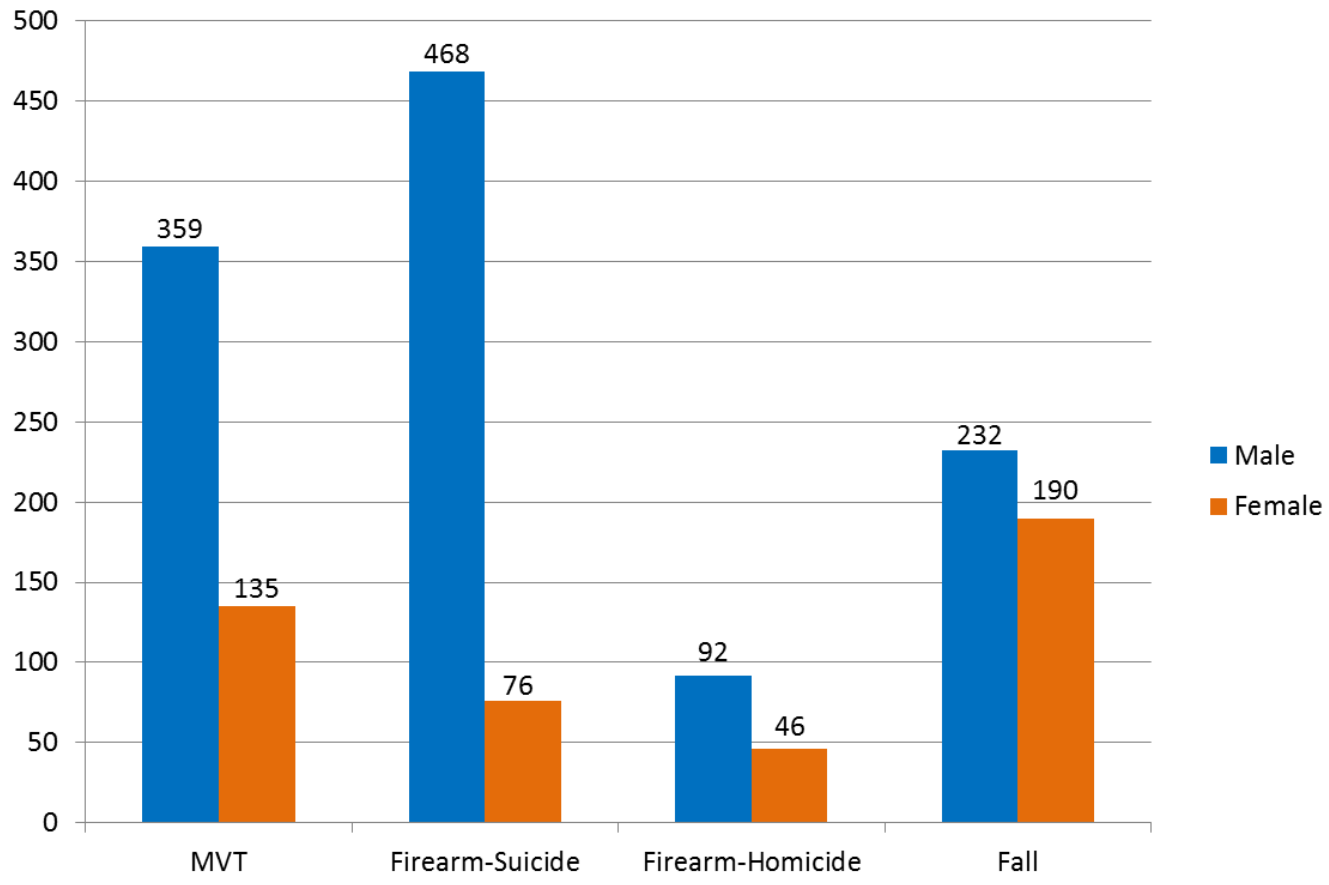
Figure 7: Leading Cause of TBI Deaths: North Carolina Residents, 2012



Data: N.C. State Center for Health Statistics, 2012
Analysis: Injury Epidemiology and Surveillance Unit

- For all mechanisms of death, there were more male than female deaths due to TBI in 2012 (Figure 8).
- The three leading mechanisms of TBI deaths in males were: 1. firearm-suicide, 2. motor vehicle traffic (MVT) crashes, and 3. falls (Figure 8).
- The three leading mechanisms of TBI deaths in females were: 1. falls, 2. MVT crashes, and 3. firearm-suicide (Figure 8).
- Males were more than six times more likely to die from a TBI associated with firearm-suicide, two times more likely to die from a TBI associated with firearm-homicide, and almost three times more likely to die from a TBI associated with a motor vehicle traffic crash than females.

Figure 8: Leading Mechanisms of TBI Deaths by Sex: North Carolina Residents, 2012

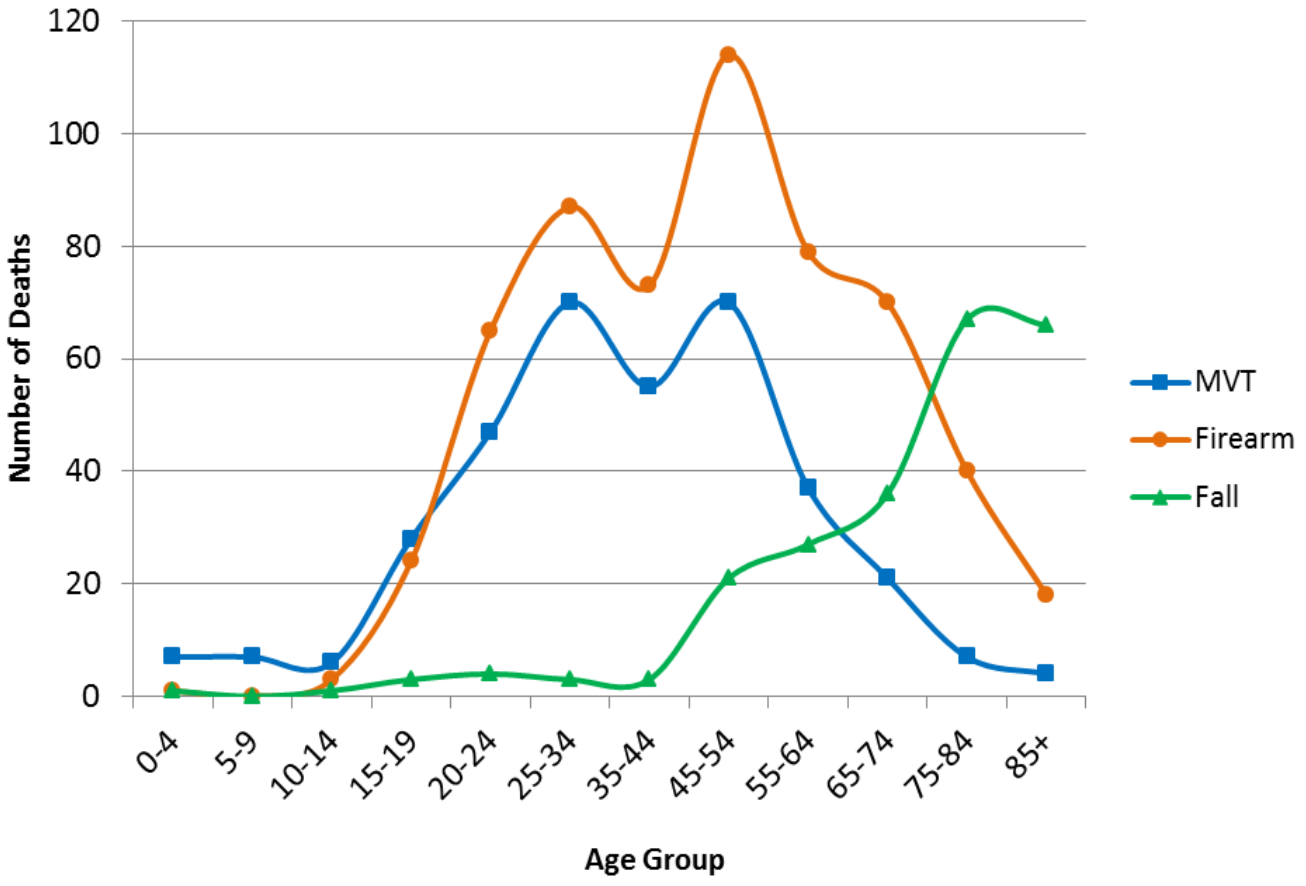


Data: N.C. State Center for Health Statistics, 2012
Analysis: Injury Epidemiology and Surveillance Unit

Different causes of injury are more prevalent in certain age groups than others. In North Carolina in 2012, the cause of TBI differed considerably by both age and gender. Figures 9 and 10 display these trends.

- Male TBI deaths were relatively low in number until the age of fifteen.
- MVT associated TBI deaths peaked among males age 25 to 34 and again among males age 45 to 54. After age 54, MTV associated TBI deaths dropped off sharply. A similar pattern was observed for all firearm associated TBI deaths with an especially large peak among males age 45 to 54 (Figure 9).
- Fall associated TBI deaths were low in number among males until age 45. After age 45, fall associated TBI deaths steadily increased among males until a peak among those age 75 and older (Figure 9).

Figure 9: Top Three Causes of TBI Death in Males: North Carolina Residents, 2012

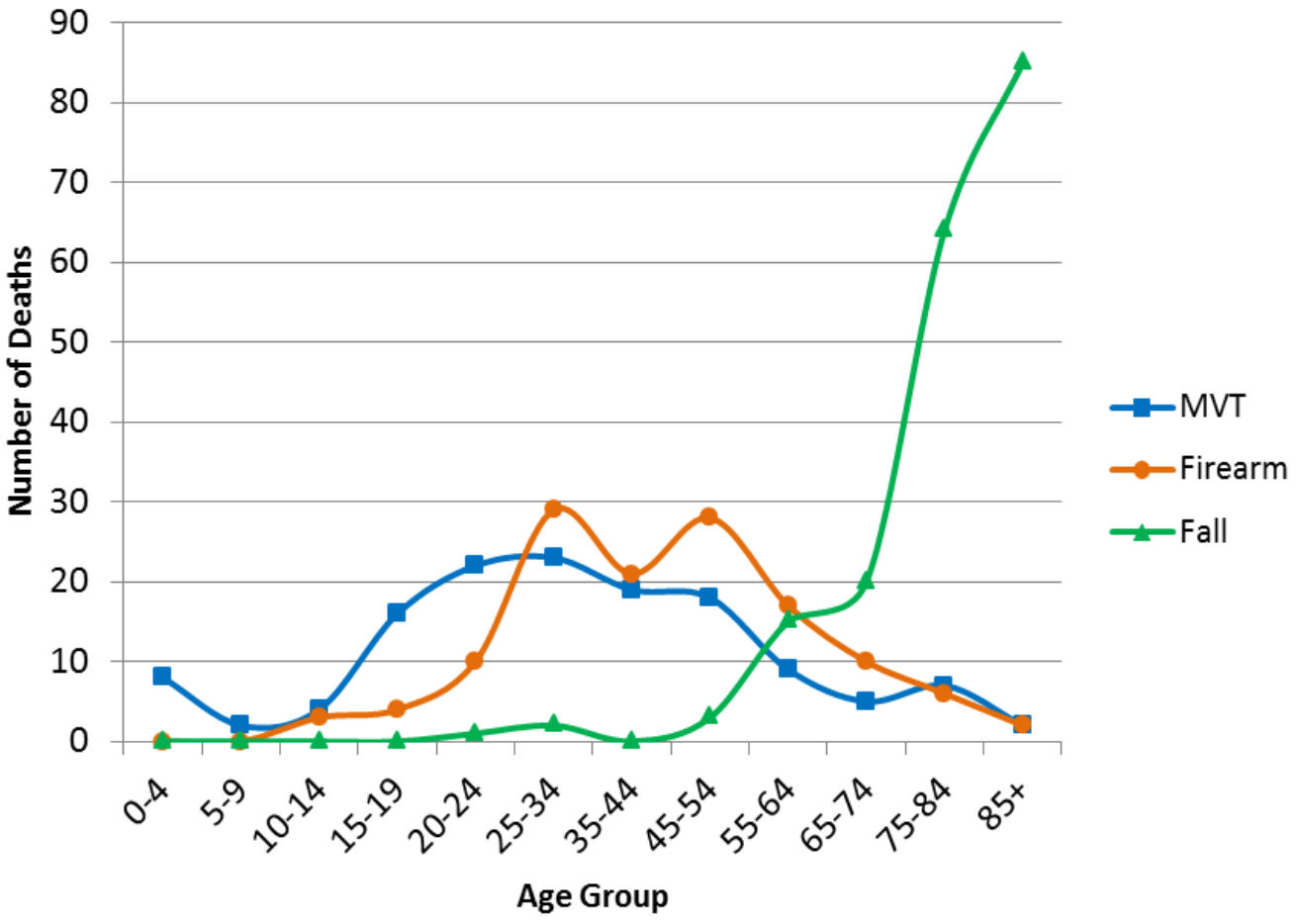


Data: N.C. State Center for Health Statistics, 2012
Analysis: Injury Epidemiology and Surveillance Unit
*Missing 1 of unknown age.

In 2012, female TBI deaths displayed slightly different patterns than male TBI deaths by age and cause.

- In contrast to males, females displayed a small peak in MVT associated TBI deaths among those age 20 to 34, a younger age group than for males (Figure 10).
- As with males, all firearm associated TBI deaths peaked among females age 25 to 34 and age 45 to 54, though the overall number of deaths in these age groups was much lower than that for males (Figure 10).
- Fall associated TBI deaths were low in number among females until age 55 after which the number of deaths rose sharply until a peak among females age 85 and older. The number of deaths increased much more sharply among older adult females than among older adult males (Figure 10).

Figure 10: Top Three Causes of TBI Death in Females: North Carolina Residents, 2012

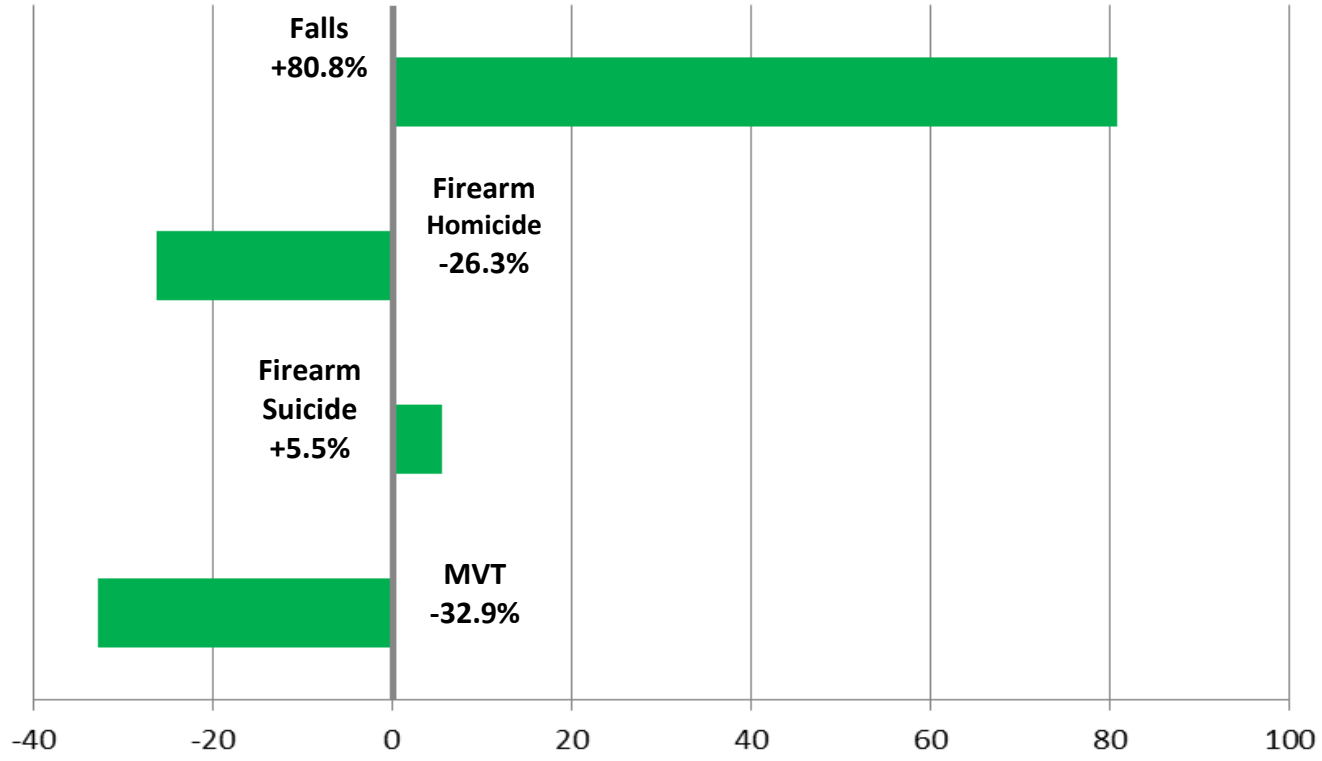


Data: N.C. State Center for Health Statistics, 2012
Analysis: Injury Epidemiology and Surveillance Unit

Since 2000, trends regarding the causes of TBI deaths have changed (Figure 11).

- In 2000, the leading cause of TBI death was MVT crashes with 662 deaths and a rate of 8.2 (95% CI 7.6-8.8). In 2012, the number of MVT deaths had dropped to 540 deaths and a rate of 5.5 (95% CI 5.1-6.0). Between 2000 and 2012 the rate of MVT deaths due to TBI decreased by more than 30 percent.
- In 2012, the leading cause of TBI death was suicide by firearm with a rate of 5.8 (95% CI 5.3-6.3) representing more than a 5 percent increase compared to 2000 (5.4, 95% CI 5.0-6.3).
- The rate of firearm associated TBI homicide deaths decreased by over 25 percent between 2000 (1.9, 95% CI 1.6-2.2) 2012 (1.4, 95% CI 1.2-1.7).
- The rate of fall associated TBI deaths among North Carolina residents increased over 80 percent between 2000 and 2012. In 2000, the rate of TBI deaths due to falls was 2.6 (95% 2.2-3.0). In 2008, this rate had increased to 3.7 (95% CI 3.3-4.1). This trend mirrors the increase in all fall-related deaths in North Carolina over the last decade[15].

Figure 11: Percent Difference in Rates of Leading Mechanisms of TBI Death: North Carolina Residents, 2000 vs. 2012



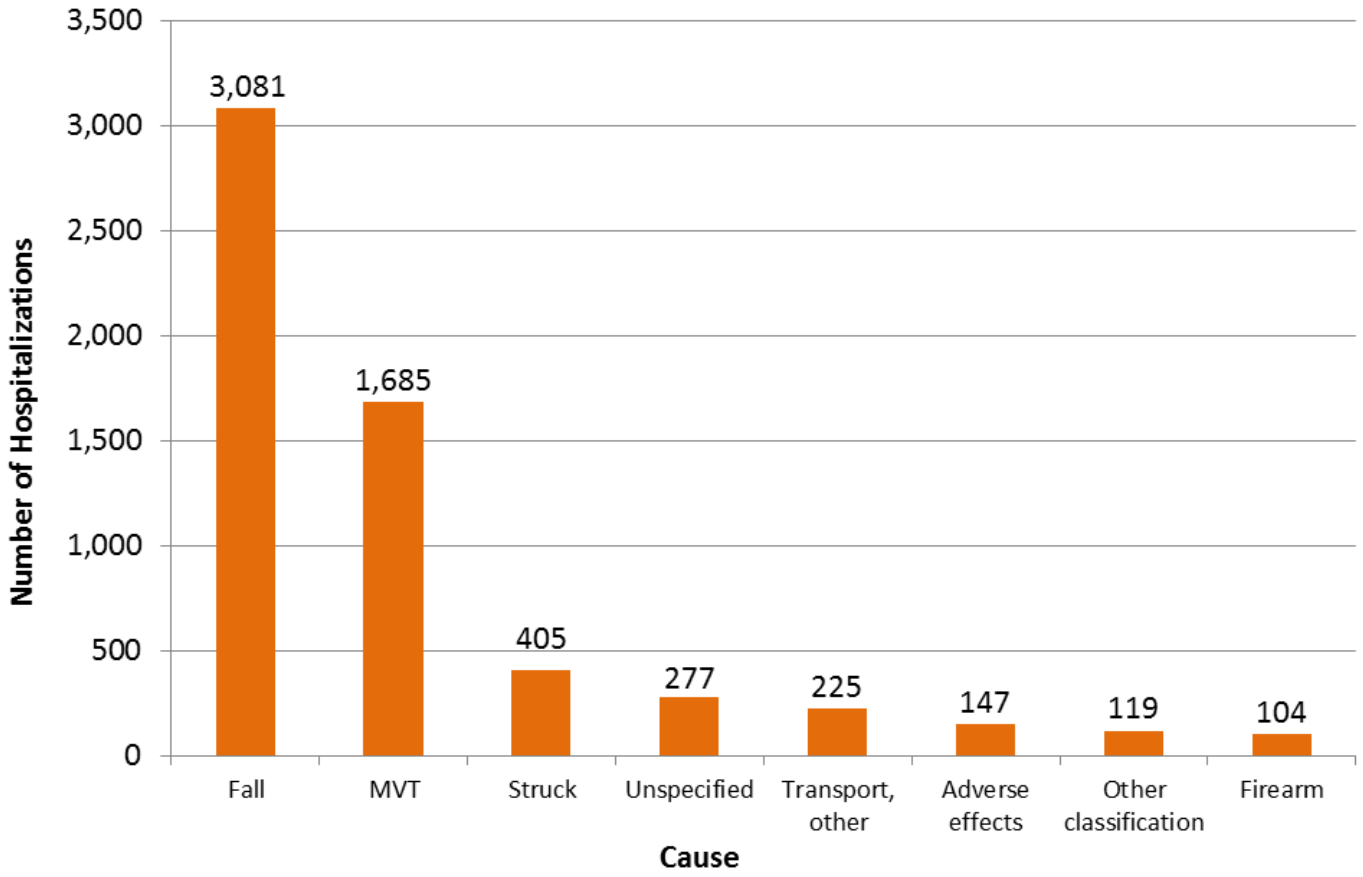
Data: N.C. State Center for Health Statistics, 2012
Analysis: Injury Epidemiology and Surveillance Unit

Leading Causes of TBI - Hospitalizations:

Hospitalizations due to TBIs are more common than TBI deaths. Unfortunately, many individuals who survive a TBI require long-term medical care, and TBI survivors experience an average reduction in life expectancy of four years[16,17]. Nationally, each year an estimated 80,000 to 90,000 individuals experience the onset of long-term disability as a result of a TBI which places an extensive burden on the health care system[9]. Figure 12 presents leading causes of TBI hospitalizations for 2011[5]:

- Unlike deaths, falls (3,081 hospitalizations) are the leading cause of TBI hospitalizations in North Carolina followed by MVT crashes (1,685 hospitalizations).
- After MVT crashes, there is a large drop between the second and third leading causes of TBI hospitalizations. TBI hospitalizations due to being struck by an object accounted for 405 hospitalizations; about one-fourth of the number of MVT crashes.

Figure 12: Leading Causes of TBI Injuries--Hospitalizations: North Carolina Residents, 2011



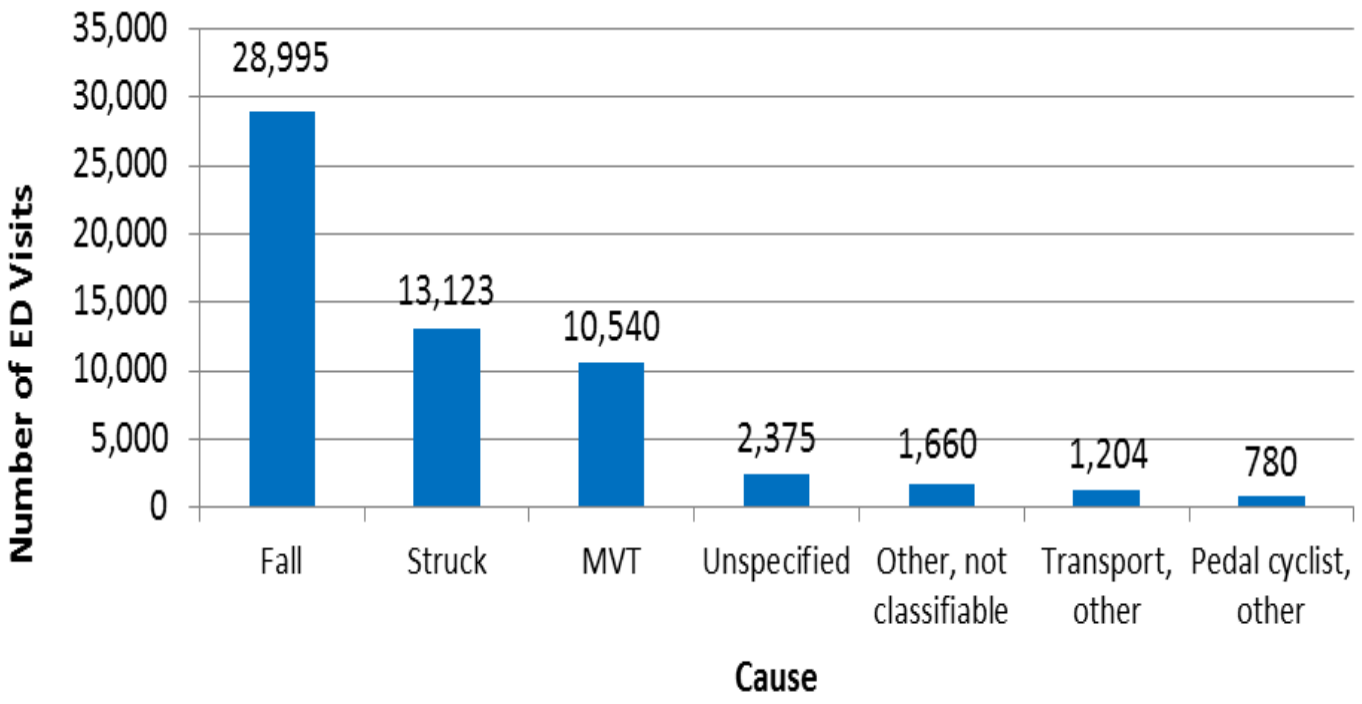
Data: N.C. State Center for Health Statistics, 2011
Analysis: Injury Epidemiology and Surveillance Unit

Leading Causes of TBI - Emergency Department (ED) Visits:

There are more ED visits due to TBIs than all TBI hospitalizations and deaths combined, although TBIs may be underreported in the ED, especially in patients presenting with other acute life-threatening injuries[18]. ED data capture some of the less severe TBIs, though even mild to moderate TBIs can result in disability, especially in children and the elderly[13]. In addition, it is important to note that individuals with a history of a TBI may be at an increased risk of suffering from a future TBI[19]. Figure 13 presents leading causes of ED visits for 2012[6]:

- Similar to hospitalizations, falls were the leading cause of TBI ED visits (28,995 visits).
- TBIs related to being struck by an object were the seconding leading cause of TBI ED visits (13,123 visits) followed by MVT crashes (10,540 visits).
- Over twice as many North Carolina residents visited the ED due to fall associated TBIs than TBIs relating to being struck by an object.

Figure 13: Leading Causes of TBI Injuries - ED Visits: North Carolina Residents, 2012



Data: NC DETECT, 2012
Analysis: Injury Epidemiology and Surveillance Unit

Conclusions:

Traumatic brain injury (TBI) is a significant source of morbidity and mortality among North Carolina residents and exacts a heavy toll on the health, relationships, and economic security of individuals, families, and communities. Often referred to as the "silent epidemic", the effects of TBIs including changes in memory, reasoning, communication, and emotion are not always readily apparent, and awareness of TBI and the associated consequences is relatively limited among the general public. TBI is a complex problem that affects all sexes, age groups, and races and is due to a range of causes including motor vehicle crashes, firearms, and falls, which all may require different intervention and prevention strategies. In order to fully address this complicated public health issue in North Carolina, organizations with backgrounds in health, advocacy, research, education, law enforcement, and policy must partner. Additionally, continuing population-based surveillance is necessary to provide data on changing trends regarding TBI. Hopefully the data provided in this document will be used to aid in TBI prevention and prompt future research priorities.

Additional Sources of Information:

North Carolina:

North Carolina Division of Public Health, Injury and Violence Prevention Branch
Phone: (919) 707-5425
Email: beinjuryfreenc@dhhs.nc.gov
Website: www.injuryfreenc.ncdhhs.gov

North Carolina Division of Mental Health, Developmental Disabilities, and Substance Abuse
Traumatic Brain Injury Program
Phone: (919) 715-5989
Email: TBIContact@dhhs.nc.gov
Website: www.dhhs.state.nc.us/mhddsas/tbi/index.htm

Brain Injury Association of North Carolina
Phone: (800) 377-1464
Email: bianc@bianc.net
Website: www.bianc.net

National:

Centers for Disease Control and Prevention, National Center for Injury Prevention and Control
Phone: (800) 232-4636
Email: cdcinfo@cdc.gov
Website: www.cdc.gov/ncipc/tbi/TBI.htm

National Institute of Neurological Disorders and Stroke
Phone: (800) 352-9424
Website: www.ninds.nih.gov/disorders/tbi/tbi.htm

Brain Injury Association of America
Phone: (800) 444-6443
Email: braininjuryinfo@biausa.org
Website: www.biausa.org

Brain Trauma Foundation
Phone: (212) 772-0608
Website: www.braintrauma.org

Notes:

Rates: All rates (unless documented otherwise) are per 100,000 North Carolina residents. Rates are not age-adjusted, unless labeled as such.

95 Percent Confidence Intervals: Data are frequently reported as point estimates with an associated 95 percent confidence interval. A confidence interval is the range of values within which the expected "true" value falls 95 percent of the time. In general, a rate with a large numerator will have a narrower 95 percent confidence interval than a rate with a small numerator[20].

Population Estimates: The North Carolina State Center for Health Statistics provided population data for the years 1990-2008. These estimates originate from the National Center of Health Statistics' Bridged Population Files.

Death Data: The North Carolina State Center for Health Statistics provided death certificate data for every death in North Carolina. Only North Carolina residents with a North Carolina county address were considered in our analyses. Deaths were limited to events in which the primary cause of death was identified as an injury. Primary cause of death was assigned with the International Classification, 10th Revision (ICD-10) codes. The coding used to classify traumatic brain injury fatalities was: S01.0-S01.9, S02.0, S02.1, S02.3, S02.7-S02.9, S04.0, S06.0-S06.9, S07.0, S07.1, S07.8, S07.9, S09.7-S09.9, T01.0, T02.0, T04.0, T06.0, T90.1, T90.2, T90.4, T90.5, T90.8, and T90.9.

Hospital Discharge Data: The North Carolina State Center for Health Statistics provided hospital discharge data for every hospital discharge of North Carolina residents. A hospital discharge occurs after a patient leaves a hospital following admission. This data does not represent number of patients, but number of discharges (multiple discharges per patient are possible). Cause of injury was assigned with International Classification, 9th Revision, Clinical Modification (ICD-9-CM) External Causes of Injury codes (E Codes). The coding used to classify traumatic brain injuries was: 800.0-801.9, 803.0-804.9, 850.0-854.19, 950.1-950.3, 959.01, and 995.55.

Emergency Department Data: The North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT) is a state system that collects and monitors emergency department (ED) for public health purposes. NC DETECT receives data on at least a daily basis from hospital emergency departments statewide to provide early detection and timely public health surveillance. As of 01/2007, NC DETECT was receiving data from 90 of the 112 hospital EDs. The ED data and the hospital discharge data are not mutually exclusive. Cause of injury was assigned with International Classification, 9th Revision, Clinical Modification (ICD-9-CM) External Causes of Injury codes (E Codes). The coding used to classify traumatic brain injuries was: 800.0-801.9, 803.0-804.9, 850.0-854.19, 950.1-950.3, 959.01, and 995.55.

Glossary[21]:

Adult: Person 18 years of age or older at date of death/injury.

Adverse effects: An injury caused by complications following the administration of a medication or medical procedure.

Assault: Injury resulting from an act of violence where physical force by one or more persons is used with the intent of causing harm, injury, or death to another person.

Child: Person less than 18 years of age at date of death/injury.

Fall: An injury caused by descending rapidly and striking a surface.

Firearm: An injury caused by a projectile shot by a powder-charged gun. Firearm-related injuries include hand-guns, shot-guns, and rifles. Firearm-related injuries do not include paint, nail, or air guns.

Intent of injury: Whether or not an act that caused an injury was committed on purpose.

Intentional injury: An injury caused by a purposeful act by oneself (self-inflicted) or another individual (assault).

Mechanism (cause) of death: The reason or event that precipitates the death/injury.

Motor vehicle-traffic (MVT): A crash involving a motor vehicle on a highway, street, or road.

North Carolina resident: A resident of North Carolina with a verifiable county of residence. All deaths and injuries reported in this report are North Carolina residents.

Other-not classifiable: An injury by a known cause that does not fit into an established category.

Pedal cyclist: An injury to a pedal cyclist caused by a collision with a human, animal, or inanimate object such as a vehicle.

Pedestrian: An injury to a person caused by a collision with a vehicle including a motor vehicle, bicycle, train, and etc.

Rate: Calculated as count x 100,000/population.

Self-inflected injury: An injury caused by an act to deliberately harm oneself.

Struck: An injury caused by being hit or crushed by a human, animal, or inanimate object other than a vehicle or machinery.

Transport-other: An injury caused by a person boarding or riding a vehicle other than a motor vehicle or bicycle such as animal-drawn vehicles, ATVs, ski-lifts, and etc.

Traumatic brain injury (TBI): An injury caused by a blow to the head or a penetrating head injury that disrupts the function of the brain.

Undetermined Intent: An injury in which the medical examiner/hospital/emergency department did not have enough information to describe the intent of injury.

Unintentional injury: An injury that is not caused by an act with intent to harm oneself or another individual.

Unspecified injury: An injury in which the medical examiner/hospital/emergency department did not have enough information to describe the cause of injury.

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